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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/682,113

10/10/2003

Moto Yabuki

243878US2S

8208

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7590

09/23/2004

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ALEXANDRIA, VA 22314

EXAMINER

DICKEY, THOMAS L

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 09/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/682,113

Applicant(s)

YABUKI, MOTO

Examiner

Thomas L Dickey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 August 2004.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.  
4a) Of the above claim(s) 10-14 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-9 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 10 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 12/11/2003.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

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## **DETAILED ACTION**

### ***Election/Restriction***

1. Applicant's election without traverse of Group II, claims 1-9 in the Paper filed 08/25/2004 is acknowledged.

### ***Oath/Declaration***

2. The oath/declaration filed on 03/10/2004 is acceptable.

### ***Drawings***

3. The drawings are objected to because there is no single drawing in which all of the claimed features each have part numbers. Part numbers for the bottom electrode 21 top electrode 22 dielectric film 22 first hole 51 second hole 53 first conductive portion 54a second conductive portion 59 and barrier metal film 53a should all be shown in a single drawing appropriate for the OG figure.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a

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drawing figures are to be canceled or added, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Priority***

4. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Information Disclosure Statement***

5. The Information Disclosure Statement filed on 12/11/2003 has been considered.

***Specification***

6. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

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***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,2,4-6,8 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by **BAEK** (6,200,821).

Baek discloses a semiconductor device comprising a semiconductor substrate 10; a capacitor 16-17-18 provided above the semiconductor substrate 10 and including a bottom electrode 16, a Pt (being one of Pt and Ir) top electrode 18, and a ferroelectric dielectric film 17 provided between the top electrode 18 and the bottom electrode 16; an insulating region 19 surrounding the capacitor 16-17-18 and having a first hole (no part #, seen formed in insulating region 19 above capacitor 16-17-18) which extends in a vertical direction and reaches the top electrode 18 and a second hole (no part #, seen formed in insulating region 19 above transistor 13) having a depth greater than that of the first hole, which extends in the vertical direction and is spaced away from the capacitor 16-17-18; a first wiring 21 connected to the top electrode 18 and including a first conductive portion (an integral part of first wiring 20) formed in the first hole, a second conductive portion (another integral part of first wir-

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ing 20) formed in the second hole, and a third conductive portion (yet another integral part of first wiring 20) formed on the insulating region 19 and connecting the first conductive portion and the second conductive portion; a transistor 13 provided on the semiconductor substrate 10 and electrically connected to the first wiring 21; the first wiring 21 having a TiN (being one of TiN, NbN, TaN, and TaAlN) barrier metal film 20 between the insulating region 19 and the first conductive portion and having no barrier metal film between the insulating region 19 and the second conductive portion (the second conductive portion being the portion of first wiring 21 formed in the second hole). Note figures 1C-1E and column 2 lines 52-65 of Baek.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over **BAEK** (6,200,821) in view of the **ADMITTED PRIOR ART**

A. With regard to claim 3, Baek discloses a semiconductor device with all the elements of claim 3 except for the requirement of a second wiring including a third conductive portion formed in a third hole extending into the insulating region in a ver-

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tical direction and reaching the bottom electrode, the second wiring having a barrier metal film between the insulating region and the third conductive portion. Note figures 1C-1E and column 2 lines 52-65 of Baek. However, the admitted prior art discloses a semiconductor device with a second wiring 34b-35b-39b including a third conductive portion 35b formed in a third hole 32 extending into an insulating region 24 in a vertical direction and reaching a bottom electrode 21, the second wiring 34b-35b-39b having a barrier metal film 34b between the insulating region and the third conductive portion 35b. Note prior art figures 3A-3D and page 2 line 12 through page 3 line 5 in the background section of the instant application.

Therefore, it would have been obvious to a person having skill in the art to augment Baek's semiconductor device with the second wiring including a third conductive portion formed in a third hole extending into the insulating region in a vertical direction and reaching the bottom electrode, the second wiring having a barrier metal film between the insulating region and the third conductive portion such as taught by the admitted prior art in order to provide a path to ground for the bottom electrode to thus provide the bottom electrode with the ability to supply a full complement of "mirror charge" for the top electrode to thus allow the top electrode to store maximum charge at a given voltage.

**B.** With regard to claim 7, Baek discloses a semiconductor device with all the elements of claim 7 except that Baek discloses that the first and second conductive por-

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portions comprise silicon instead of aluminum as required by claim 7. Note figures 1C-1E and column 2 lines 52-65 of Baek. However, the admitted prior art discloses a semiconductor device with first 35a and second 35 b conductive portions comprising aluminum. Note prior art figure 3D and page 3 lines 3-5 in the background section of the instant application. Aluminum has a lower resistivity than silicon.

Therefore, it would have been obvious to a person having skill in the art to replace the silicon conductive portions of Baek's semiconductor device with the aluminum conductive portions such as taught by the admitted prior art in order to reduce the resistivity of the first and second conductive portions to thus provide faster storage times (due to reduced RC time constant resulting from reduced resistivity of the wiring that feeds charge to the ferroelectric/dielectric storage capacitor).

### ***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas L Dickey whose telephone number is 571-272-1913. The examiner can normally be reached on Monday-Thursday 8-6.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

**TLD**  
**09/04**

  
**Minhloan Tran**  
**Primary Examiner**  
**Art Unit 2826**